

ART. II.—*Further Notes on Australian Hydroids—V.*

BY W. M. BALE, F.R.M.S.

[Read 12th March, 1925.]

SAABA ARENOSA (Bale).

N.gen. and sp.? Bale, Proc. Roy. Soc. Vic., n.s., vi., 1893, p. 96, pl. iii., fig. 1, 2.

Sacculina arenosa Bale, Proc. Roy. Soc. Vic., n.s., xxxi., 1919, p. 333.

Saaba arenosa Stechow, Archiv. für Naturg. Jg. 88, Abt. A., 1922, p. 154; Zool. Jahrb., Abt. f. Syst., 47, 1923, p. 92.

I inadvertently applied to this form, which Stechow has since named *Saaba*, the name *Sacculina*, which belongs to a well-known crustacean. I noticed the error immediately on publication, but too late for correction. I have, however, to thank several correspondents, who obligingly called my attention to the oversight, in order to enable me to correct it.

I observe also that the same name has been given to a genus of Bryozoa.

SERTULARIA FURCATA Trask. (Fig. 1.)

Sertularia furcata Trask, Proc. Calif. Acad. Nat. Sciences, i., 1857, p. 112, pl. v., fig. 2. Clark, Trans. Conn. Acad., iii., 1876, p. 258, pl. xxxix., fig. 3. Torrey, Univ. of Calif. Publ., Zoology, i., 1902, p. 66, pl. viii., fig. 73-75; Idem, ii., 1904, p. 31. Fraser, Bull. State Univ. Iowa, vi., 1911, p. 72, pl. vi., fig. 5. Bale, Biol. Results "Endeavour," iii., 1915, p. 276; Trans. N.Z. Inst. 55, 1924, p. 247.

Sertularia pulchella Nutting, American Hydroids, II. The Sertularidae, 1904, p. 55 (in part).

Sertularia operculata, in part, Hartlaub, Zool. Jahrb., Suppl. vi., iii., 1905, p. 664. Jäderholm, Kungl. svenska Vetenskapsakad. Handl., 45, 1909, p. 97.

Amphisbetia furcata Stechow, Zool. Anzeig., lix., 1923, p. 69.

S. furcata, which is closely allied to *S. minima* and *S. muelleri*, usually grows on "eel-grass" (*Phyllospadix*), which it clothes with a dense forest of simple shoots, directed slightly upward, and attaining about half an inch in length. The main hydrorhizal filaments run straight up the leaves, and are connected by numerous transverse and oblique branches. The peduncles of the hydrocauli are directed upward at a small angle with the hydrorhiza; they are

conspicuous from their darker colour, and consist of the apophysis with a single very short internode, which is succeeded by the first hydrothecal internode. The joints at this point are of the very oblique type often incorrectly called "twisted joints." The

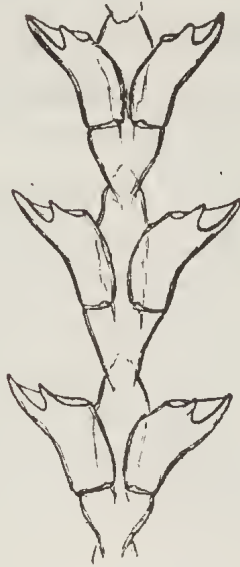


FIG.—1. *Sertularia furcata* Trask. $\times 40$.

hydrorhiza is stout, and exhibits here and there some of the lateral inflections of the perisarc characteristic of typical forms of *S. minima*, but much larger and less regular. Trask calls the hydrorhiza the "main stem," or the "rachis," and the simple shoots "pinnae," but the latter are not in any regular order, and I have not found the hydrorhiza jointed, as Trask describes it.

The hydrocaulus is divided into rather stout internodes, each bearing a pair of opposite hydrothecae; the joints are somewhat oblique, but in the older parts of the shoots they become thickened and indistinct. On the lower parts of the shoots the paired hydrothecae are not adnate to each other, but only approximate in front; it is often only on the upper half of the shoot that they are actually in contact, and then only just at the base. They diverge from the base up, and near the middle are usually still more bent outward, but they again become slightly more ascending at the top, and the two spine-like teeth are accordingly directed more upward than outward. On the lower part of the colony, where they are not in contact, the hydrothecae bear some resemblance to those of *S. operculata*.

Here and there one finds in the infrathecal chamber one of the little circular orifices in the perisarc which are characteristic of *S. minima* and its allies. They are here minute, and require careful

search to discover them, especially as their rim scarcely projects beyond the outer surface of the perisarc.

The opercular structure is highly developed, not merely filling up the sinuses between the marginal teeth, but often projecting all round, so that it resembles an inner bidentate thecostome, the lateral teeth of which subtend those of the true thecostome, but are much shorter and more delicate.

The gonangia are pyriform or obovate, compressed, often a little angular at the shoulders; there is usually only one in a shoot, which springs from below the first hydrothecal internode, but exceptionally there may be two, or even more, always on the proximal portion of the shoot.

From *S. minima* the species is distinguished by its much greater size throughout, and the densely clustered growth, while the hydrothecæ differ in their more divergent lower portion, and in the more upward-directed teeth, and the internodes are usually less broadly rounded at the base.

S. muelleri is quite similar in habit to *S. furcata*, growing on a similar plant, and without microscopical examination the two species might be mistaken for each other. In *S. muelleri*, however, the internodes are much more slender, especially above the hydrothecæ, the latter are more expanding towards the mouth, and the marginal teeth are not so spine-like, but are more triangular. The gonangia vary from one to four or five.

Stechow records the species from Bunbury, West Australia, but it is doubtful if the identification is correct. Its relationship with *S. minima* is so obvious that it could scarcely be overlooked by any observer acquainted with the two species, and since Stechow does not refer it to the genus *Nemella*, proposed by him for the *S. minima* group, (on the assumption that the little orifices in the perisarc represent sarcothecæ), it seems possible that he may have observed a different species. According to a later description and figure it agrees with *S. pumiloides* Bale (*S. minima* var.?).

For my specimens of *S. furcata*, from the coast of California, I have to thank Mr. W. S. Wallace, of the Hopkins Marine Station, Pacific Grove, Cal. The species has not, I think, been recorded from Australia prior to Stechow's reference.

SERTULARIA XANTHA (Stechow).

Sertularia divergens Busk, Voy. of Rattlesnake, i., 1852, p. 392. Bale, Austr. Hydr. Zooph., 1884, p. 81, pl. v., fig. 3, pl. xix., fig. 16; Proc. Roy. Soc. Vic., n.s., xxvi., 1913, p. 131. Billard, Ann. Sci. Nat., 9 ser., ix., 1909, p. 323.

Tridentata xantha Stechow, Zool. Anzeig., lvi., 1923, p. 12; Zool. Jahrb., Abt. f. Syst. etc., 47, 1923, p. 206.

Not *Dynamena divergens* Lamouroux, Hist. Polyp. Cor. Flex., 1816, p. 180, pl. v., fig. 2a, 2b.

?Not *Tridentata xantha* Stechow, Zool. Anzeig., lix., 1924, p. 64.

Stechow's proposed genus *Tridentata* is characterized by the possession of a third small tooth, situated on the upper border of thecostome. There is no such tooth in the present species, but the superior margin, instead of being uniformly concave, is very slightly curved outward in the middle, so that seen laterally it has somewhat the appearance of a rudimentary tooth.

There is a small linear process projecting into the theca from the outer side, a little above the base, with which the blindsack is connected. In my original specimens it was very delicate, and obscured by the remains of the hydranth, and was consequently overlooked.

I formerly considered *S. flosculus* Thompson as identical with this species, but later, following Billard, referred it to *S. marginata* (Kirchenpauer). It does not seem possible, however, to be certain as to the identity of *S. flosculus*.

The form referred to *T. xantha* by Stechow in his later paper does not appear to be the same. It has stouter thecæ, the width of a pair at the base being .22 mm., while in the present species it is about .16 to .18; it has the node between the first and second pair on the pinnae "oft undeutlich," and it has up to 12 pairs of thecæ on a pinna, *S. xantha* having only 4 or 5, or rarely 6.

SERTULARIA TENUIS Bale.

Sertularia tenuis Bale, Proc. Roy. Soc. Vic., n.s., xxvi., 1913, p. 129 (synonymy).

Tridentata tenuis Stechow, Zool. Jahrb., Abt. f. Syst. etc., 47, 1923, p. 205.

The remarks under *S. xantha*, regarding the form of the thecostome and the internal processes, are equally applicable to *S. tenuis*, of which *S. xantha* may be a variety.

SERTULARIA ACUTA (Stechow).

Sertularia loculosa Bale, in part, Cat. Aust. Hyd. Zooph., 1884, p. 91, pl. iv., fig. 5, 6, pl. xix., fig. 9; Tr. and Proc. Roy. Soc. Vic., xxiii., 1887, p. 93; Proc. Roy. Soc. Vic., n.s., xxvi., 1913, p. 121, pl. xii., fig. 7, 8; Biol. Res. "Endeavour," 1909-1914, iii., 1915, p. 272. Warren, Ann. Natal Gov't. Mus., i., 1908, p. 306, fig. 8, pl. xlvi., fig. 37. Mulder and Trebilcock, Geol. Nat., (2) vi., 1914, p. 9.

Sertularia turbinata Billard, Ann. Sci. Nat. Zool., (9) xi., 1910, p. 19 (in part).

?*Sertularia turbinata* Ritchie, Proc. Zool. Soc., 1910, p. 821.

Tridentata acuta Stechow, Zool. Anz., liii., 1921, p. 231; Zool. Jahrb., Abt. f. Syst. etc., xlvi., 1923, pp. 204, 206.

Sertularia balei Briggs, Aust. Zool., ii., 1922, p. 150.
Not *S. loculosa* Busk (Vide Bale, 1913).

This species has been renamed by Briggs and Stechow to differentiate it from *S. loculosa* Busk. The name chosen by Stechow is rather inappropriate, the species in its usual form having the two theca-lobes very obtuse. Exceptional specimens, however, have sharper lateral teeth and a third superior lobe, which is merely a slight outward curvature of the upper margin seen edgewise, so that in the ordinary aspect it appears a sharp tooth.

SERTULARIA NANA, n. sp. (Fig. 2).

Hydrocaulus simple, minute, divided into internodes each bearing two or three hydrothecæ.



FIG. 2.—*Sertularia nana*, n. sp. $\times 40$.

Hydrothecæ alternate, not close, tubular, divergent, free for about half their length; margin with two large triangular lateral teeth.

Gonangia (?)

Locality.—Port Phillip (Mr. J. Bracebridge Wilson).

Only one specimen observed, growing on *Sertularella peregrina*.

It rises from a flat rounded and lobed base, which also gives origin to a hydrorhizal filament. The shoot is borne on a stout apophysis, from which it is separated by a very oblique node. The arrangement of the hydrothecæ is alternate; between every two the rachis is slender and wavy, but distinct oblique nodes only occur below every second or third hydrotheca, the distance apart of the latter being somewhat irregular.

The whole hydrophyton is about 2 mm. in height and bears 8 thecæ.



FIG. 3.—*Sertularia gracillima*, n. sp. $\times 40$.

SERTULARIA GRACILLIMA, n. sp. (Fig. 3).

Hydrophyton monosiphonic, branched, very slender. Pinnæ alternate, each borne on a distinct process at the base of a stem-internode, which supports also an unpaired hydrotheca in the axil, and a pair of subalternate hydrothecæ above; first internode of each pinna short, without thecæ, separated from the next internode by an oblique conspicuous joint; the joint between the first internode and the cladophore much less oblique.

Hydrothecæ on the pinnæ in pairs, one or two pairs on an internode, mostly opposite, in contact in front, widely separated at the back, rather slender, the outer side curving outward and the upper part strongly divergent; margin with two strong lateral teeth.

Gonangia.—(?)

Locality.—(?)

This delicate species is closely related to *S. geminata* Bale, which according to Billard is the same as *Desmoscyphus orifissus* Allman. The internodes both of the rachis and the pinnæ are much longer than those of *S. geminata*, and the thecæ therefore much further apart, and they are not so strongly directed forward. In a direct front view the flexure outward of the hydrotheca is a gradual curve; in *S. geminata* it generally appears somewhat angular owing to the upper part being turned more forward.

Allman's figure of the front view could not be identified with either species; his lateral view seems to resemble the present form rather than *S. geminata*.

In my specimens most of the internodes of the pinnæ bear two pairs of thecæ; in *S. geminata* they more often support one pair only. In both species the first pair of hydrothecæ on the pinnæ are not exactly opposite.

The only specimen observed was about one and a half inches high, and had three or four branches. The exact locality was not ascertained.

Further observation may perhaps result in the union of both *D. orifissus* and the present species with *S. geminata*.

SERTULARELLA PEREGRINA, n. sp. (Fig. 4).

Sertularella polyzonias Bale, Catal. Aust. Hydr. Zooph., 1884, p. 104, pl. iii, fig. 1; pl. xix., fig. 25. Hartlaub, Abh. Nat. Ver. Hamb., xvi., 1900, p. 89, pl. v., fig. 3. *Sertularia Gaudichaudi* Bale, Biol. Results "Endeavour," iii., 1915, p. 280.

Not *S. polyzonias* (Linn.).

Not *S. Gaudichaudi* (Lamouroux).

Hydrocaulus monosiphonic, simple or with a few irregular branches, divided into internodes each supporting a single hydrotheca on the upper part.

Hydrothecæ alternate, both series in the same plane, aduate about half their length, divergent, ventricose below, contracted above, margin expanding, with four shallow emarginations; three internal compressed vertical teeth, two of which are within the two upper emarginations of the border, and the third below the abcauline marginal tooth.

Gonothecæ ovate, with a few annular rugæ, and a wide tubular neck; summit with three or four conical teeth, sometimes almost obsolete.

Locality.—Port Phillip; Bass Strait.

This species was referred by me in 1884 to *S. polyzonias*, the descriptions then extant not sufficing to distinguish it from that species. Later, in 1915, I referred it to *S. gaudichaudi*, which Billard considered identical with *S. mediterranea* Hartlaub and *S.*

picta (Meyen). Owing to my original specimens being poorly preserved, the internal teeth, which are very delicate, were overlooked. Hartlaub in 1900 mentioned a form from Bass Strait, which, notwithstanding that it possessed internal teeth, he referred to *S. polyzonias*; this was no doubt the same as the species before us.

The confusion which for so long existed between *S. polyzonias* and allied forms has been cleared up by Stechow (1) in two recent papers, supplemented by one of Billard's (2). According to these observers *S. picta* and *S. gaudichaudi* are distinguished from *S. polyzonias* and its more immediate allies by the much longer teeth of the thecostome and by the presence of a stria parallel with the margin. *S. picta* has internal teeth, *S. gaudichaudi* has none. Of



FIG. 4.—*Sertularella peregriana*, n. sp. $\times 40$.

the species classed by Stechow as the *polyzonias* group, *S. polyzonias* itself is distinguished from our species by the absence of internal teeth. *S. ellisi*, according to Stechow, has the internal teeth in the opposite order to those of the species before us, the

median tooth, which is larger than the others, being on the adcauline side, while the other two are equidistant from it and from each other; our species, on the contrary, having the median tooth abcauline, just below the inferior marginal tooth, while the others are equidistant. (This arrangement obtains in all species observed by me, irrespective of whether the marginal teeth are three or four). There remains *S. mediterranea*, to which our species is very closely allied, the main difference being that in *S. mediterranea* the outer side of the theca is somewhat produced, so that the aperture is oblique. Stechow indeed describes it as at right angles to the rachis, but in specimens from Biarritz, kindly sent to me by Professor Billard, I do not find the condition so pronounced, nor indeed does it appear so in Stechow's figures. In *S. peregrina* both series of thecae are almost exactly in the same plane, those of *S. mediterranea* being directed slightly forward.

The gonangia are about .22 to .28 mm. in length, the widest part most commonly a little below the middle, and the narrowing upward to the neck rather gradual; the annulations on the upper half or third are wide, but not keeled nor sharply angular. In *S. mediterranea* typical gonangia are somewhat more abruptly contracted to the neck, and the annular ridges are more marked; but in these points, as well as in the number and prominence of the coronal teeth, both species, like others of the group, vary greatly.

THUIARIA TRYPHERA (Briggs).

Sertularia geniculata Bale, Proc. Linn. Soc. N.S.W., Ser. 2, iii., 1888, p. 768, pl. xvii., figs. 6-11.

Sertularia tryphera Briggs, Austr. Zool., ii., 1922, p. 150.

Tridentata tryphera Stechow, Zool. Jahrb., Abt. f. Syst., etc., xlvii., 1923, p. 205.

?*Dynamena conferta* Kirchenpauer, Verhandl. der K.L.-C.d. Akad., xxxi., 1864, p. 10, pl., fig. 4.

Not *S. geniculata* Linn. (*Obelia geniculata*).

Though it is impossible to identify Kirchenpauer's figures of *D. conferta* with this species, I strongly suspect that they are one and the same.

The thecostome is exactly like that of *Thuiaria*, the margin forming two scarcely distinguishable lobes and very thin; though the specimen is not in good condition for examination of the operculum some of the thecae show almost certainly an abcauline flap.

PLUMULARIA WILSONI, n. nom.

Plumularia delicatula Bale, Journ. Micr. Soc. Vic., ii., 1881, p. 40, pl. xv., fig. 2: Catal. Aust. Hyd. Zooph., 1884, p. 137, pl. xi., fig. 5. Mulder and Trebilcock, Geelong Nat. iv. (2nd Ser.), 1911, p. 115, pl. ii., fig. 1: Id., vi., 1914, p. 43, pl. v., fig. 4.

Not *P. delicatula* Busk, Voy. of Rattlesn., i., 1852, p. 396.

Not *P. delicatula* Quelch, An. and Mag. N.H., 1885, p. 8.

The above name is proposed on account of the priority of Busk's *P. delicatula* (*Aglaophenia*). I have dedicated the species to my friend, Mr. James Wilson, who has often favoured me with specimens of Hydroida and Bryozoa which have been very helpful to me.

AGLAOPHENIA BAKERI Bale.

Bale, Proc. Roy. Soc. Vic., n.s., xxxi., 1919, p. 353, pl. xvii., fig. 7-8.

Examination of additional specimens enables me to give a better description of the corbulæ, those seen originally having been somewhat abnormal. Mature corbulæ are about 3.5 mm. in length, with arcuate rachis and about 13 pairs of leaflets. The sarcothecæ are closely set on the sides of the corbula, a little more sparsely on the front, about 7 in a row; individual sarcothecæ are about .104 mm. in length. The constrictions of the corbula, mentioned in the original description, are not present in these specimens.

The gonocladium bears a single hydrotheca below the corbula as a rule, but in one instance I observed two.

AGLAOPHENIA DIVARICATA (Busk) var. BRIGGSI, n. var. (Fig. 5).

Aglaophenia divaricata var., Bale, Cat. Aust. Hydr., Zooph., 1884, p. 164.

Aglaophenia divaricata var. *acanthocarpa*? Bale, "Endeavour," Report, iii., 1915, p. 313.

Not *A. acanthocarpa* Allman, Journ. Linn. Soc., Zool., xii., 1876, p. 274, pl. xxi., figs. 1-4.

As Bedot has pointed out in his Systematic Notes on the Plumularidæ, much confusion has existed in regard to *A. divaricata* and its allies, confusion which I have endeavoured to clear up, with the



FIG. 5.—*Aglaophenia divaricata*, (Busk) var. *briggsi*, n. var. $\times 80$.

aid of specimens from the British Museum, in a recent paper in the Transactions of the New Zealand Institute. (Vol. 55, 1924.)

The account there given of the New Zealand species, *A. acanthocarpa* Allman and *A. laxa* Allman, will, I trust, suffice to distinguish them from the Australian *A. divaricata*. The latter species, with the varieties *MacCoyi* and *cystifera*, is fully dealt with in the above-cited "Endeavour" Report. In the same paper the form now under consideration is referred doubtfully to the *A. acanthocarpa* Allman, an identification since found to be incorrect.

This variety, which I have seen only from Port Jackson, differs from the type mainly in the septal ridges of the hydrothecal internodes. In addition to the central one, which alone is present in *A. divaricata*, there is one proceeding obliquely forward from the base of the theca. This is much less pronounced than the others, and was formerly overlooked by me; being extremely close to the end of the internode, and the node being for the most part scarcely distinguishable, I mistook it for the actual node.

The marginal teeth of the hydrotheca, especially the anterior one, are somewhat shorter and more acute than those of typical specimens of *A. divaricata*. There is but little tendency to enlargement of the lateral sarcothecæ towards the ends of the hydrocladia, so conspicuous in some forms of *A. divaricata*.

NOTE ON NOMENCLATURE.

Certain specific patronymic names originally written by me with the final "i" doubled, have by observers generally (and by myself in later papers) been written with a single "i." According to the ruling of the International Commission however (Vide Opinion 8), the following forms are correct:—

Tubularia Ralphii.

Plumularia Buskii.

Plumularia Wattsii.

Halicornaria Haswellii.

REFERENCES.

1. STECHOW. *Sitzungsberichten der Gesellschaft für Morphologie und Physiologie in München*, 1919, and *Zool. Jahrb., Abt. für Systematik, Jena*, 1293.
2. BILLARD *Revue Suisse de Zoologie*, 1924.